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EXAMINER	
LEUNG, JENNIFER A	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)
	10/615,976	FUTAMI ET AL.
	Examiner	Art Unit
	Jennifer A. Leung	1797

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 May 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,8 and 10-33* is/are pending in the application.

4a) Of the above claim(s) *25-33* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,8 and 10-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Jennifer A Leung
1/18/2008

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 4, 2007 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1-5, 10-17, 19, 20 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Young et al. (US 2003/0226806) in view of Giddings (US 4,894,146).

Regarding claims 1, 3 and 24, Young et al. (FIGs. 1-4; sections [0034-[0040]) discloses a fine channel device **5** comprising:

a fine channel **10** provided with at least two inlet ports **110**, inlet channels (i.e., ingress channels **100**) communicating with the inlet ports **110**, a confluent portion (i.e., at the point where inlet channels **100** intersect to form diffusion channel **10**) communicating with the inlet channels **100**, a branch portion (i.e., at the point where the diffusion channel **10** splits to form two outlet channels **100**) communicating with the fine channel **10**, from which at least two outlet channels (i.e., egress channels **100**) are branched, and outlet ports **110** communicating with the outlet channels **100**;

wherein the fine channel **10** is provided with a plurality of partition walls (i.e., channel structures **200**) arranged along a boundary formed by at least two kinds of fluid fed from the inlet ports **110**; wherein the plurality of partition walls **200** are arranged with intervals **205** in a flowing direction of fluid (see FIG. 4); wherein each partition wall **200** has a height substantially the same as the depth **D** of the fine channel **10** (see FIG. 2; also, section [0040]); and wherein each partition wall has an upper edge that is elongated and extends along a line parallel to a fluid flow path within the fine channel (e.g., as shown in FIG. 6A, each of the channel structures **200** is elongated with a given "length" and extends along a line parallel to the fluid flow path, designated "C_L"; see also section [0042]).

Young et al. is silent as to the addition of a partition wall being connected to the confluent portion and another partition wall being connected to the branch portion, such that the intervals **205** between the partition walls **200** are present along the entire length of the fine channel **10**, except in the vicinity of the confluent portion and the vicinity of the branch portion of the fine channel.

Giddings (FIG. 3) teaches a fine channel device wherein a partition wall (i.e., inlet splitter

15a) is connected to the confluent portion and another partition wall (i.e., outlet splitter **15d**) is connected to the branch portion. It would have been obvious for one of ordinary skill in the art at the time the invention was made to further provide a partition wall being connected to the confluent portion and a partition wall being connected to the branch portion, such that the intervals **205** between the partition walls **200** are present along the entire length of the fine channel **10**, except in the vicinity of the confluent portion and the vicinity of the branch portion of the fine channel **10** of Young et al., on the basis of suitability for the intended use, because the provision of partition walls, connected to the confluent and branch portions, improves the splitting of the plural fluid streams into their physically distinct laminae at the entrance and exit of the fine channel, as taught by Giddings.

The newly added limitation of the intervals being, "a distance that is greater than an elongated length of each partition wall," is not considered to confer patentability to the claim since the precise distance would have been considered a result effective variable by one having ordinary skill in the art. For instance, Young et al. (see section [0041]) discloses that,

> "As is well known to those skilled in the art, the diffusive transfer of a constituent through an interfacial boundary is directly proportional to the area of the interfacial boundary, and inversely proportional to the thickness of the interfacial boundary. It is believed that the fluid extraction device of the present invention maximizes diffusive transfer by providing a large, no-slip interfacial boundary area, and a small interfacial boundary thickness (also referred to as diffusion distance). The present invention allows for this maximized diffusive transfer without destabilizing the interfacial boundary. A stable interfacial boundary is desired in order to maintain pressure differentials across the boundary (which arise from differences in flow velocity, viscosity, or channel dimensions between the two fluid flowing in flow paths **210** and **215**)."

Young et al. (see sections [0041]-[0042]) also discloses that the diffusive transfer of a constituent through the interfacial boundary can be controlled by simply varying the dimensions, shape and/or grouping/spacing of the partition walls **200** within the fine channel **10**.

Accordingly, one having ordinary skill in the art would have routinely optimized the distance between the partition walls **200** for a given partition wall length in the system of Young et al., in order to maximize the rate of diffusive transfer of a constituent from one fluid stream to the other fluid stream through the interfacial boundary, while maintaining a stable interfacial boundary between the two or more fluid streams, *In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980), and since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claim 2, Young et al. (sections [0041]-[0042]) discloses that the diffusive transfer of a constituent through the interfacial boundary can be controlled by simply varying the dimensions, shape and/or grouping/spacing of the partition walls **200** within the fine channel **10**. Thus, it would have been obvious for one of ordinary skill in the art at the time the invention was made to configure the intervals between adjacent partition walls, in the vicinity of the inlet channels, to be smaller than the intervals between adjacent partition walls, in a central portion of the fine channel, in the modified apparatus of Young et al., on the basis of suitability for the intended use thereof, because where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller, 105 USPQ 233.*

Regarding claim 4, FIG. 4 shows that the partition walls **200** are provided at positions

apart from the confluent portion and the branch portion of the device (see also FIGs. 1 and 3).

Regarding claim 5, Young et al. (sections [0041]-[0042]) discloses that the diffusive transfer of a constituent through the interfacial boundary can be controlled by simply varying the dimensions, shape and/or grouping/spacing of the partition walls **200** within the fine channel **10**. Thus, it would have been obvious for one of ordinary skill in the art at the time the invention was made to configure the intervals between adjacent partition walls, in the vicinity of the outlet channels, to be smaller than the intervals between adjacent partition walls, in a central portion of the fine channel, in the modified apparatus of Young et al., on the basis of suitability for the intended use thereof, because where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller, 105 USPQ 233*.

Regarding claim 10, in the vicinity of the inlet channels **100** and/or the outlet channels **100**, at least two partition walls **200** are connected continuously (i.e., via a membrane **300**) in a flowing direction of fluid (see FIGs. 4,11).

Regarding claim 11, a plurality of projections (i.e., channel structures **400**) are formed at the inner wall of the fine channel partitioned by partition walls (see FIG. 12).

Regarding claim 12, the apparatus of Young et al. structurally meets the claims because the flow direction of the fluids is considered intended use. In any event, Young et al. further discloses that the inlet ports **110** for feeding fluid, the inlet channels **100** communicating with the inlet ports **110**, the outlet channels **100**, and the outlet ports **110** communicating with the outlet channels **100** (FIG. 1) are arranged so that the flowing direction of either one of at least two kinds of fluid fed in the fine channel **10** is opposite to the flowing direction of the other of said at

least two kinds of fluid fed adjacently in the fine channel **10** (i.e., counter-current flow; see FIG. 9; also sections [0043]-[0045]).

Regarding claims 13 and 14, as best understood, the inner wall at one side of the fine channel **10** partitioned by partition walls **200** has amicability to hydrophilic/hydrophobic properties to a kind of fluid fed into the fine channel, and the hydrophilic properties of a material for the inner wall at one side of the fine channel **10** partitioned by partition walls **200** may be different from hydrophilic properties of the fluid fed into the fine channel (i.e., by preferentially making the exposed surfaces of the channels and channel structures hydrophobic or hydrophilic; see section [0049]).

Regarding claims 15 and 16, a film (i.e., a polymer membrane **300**; FIG. 11 and section [0047]) having fine pores of a diameter smaller than any distance **205** between adjacent partition walls **200** is provided between adjacent partition walls **200** in a flowing direction of fluid.

Regarding claim 17, a metallic film may be disposed in the entire or a part of the inner surface of the fine channel and/or the wall surface of the partition walls (i.e., a final passivation layer **440** such as sputtered or evaporated metal; section [0052]).

Regarding claims 19 and 20, Young et al. further discloses the provision of, "appropriate fluid connections (not shown) for the attachment of a fluid conducting mechanism, such as a capillary or reservoir, to the device," (section [0038]). Although Young et al. is silent as to the instantly claimed configuration of a pump, circulating channel and reservoir tank, it would have been obvious for one of ordinary skill in the art at the time the invention was made to configure the device of Young et al. as instantly claimed, because the Examiner takes Official Notice that the provision of such fluid conducting mechanisms, on the basis of suitability for the intended

use, is within the level of ordinary skill in the art.

3. Claims 8, 18 and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Young et al. (US 2003/0226806) in view of Giddings (US 4,894,146), as applied to claims 1 and 17 above, and further in view of Christel et al. (US 6,368,871).

Regarding claim 8, Young et al. is silent as to a portion of the fine channel **10** having a shape other than a straight shape, with the partition wall **200** in said portion extending from the vicinity of a portion originating a non-straight portion of fine channel **10** to the vicinity of a portion ending the non-straight portion of fine channel **10**. Christel et al. teaches a fine channel device comprising a portion of the fine channel **110** having a shape other than a straight shape, with a partition wall **111** in said portion, arranged along the boundary extending from the vicinity of a portion originating a non-straight portion of fine channel to the vicinity of a portion ending the non-straight portion of fine channel (i.e., a plurality of U-shaped fine channel portions, each containing a U-shaped micro-column or island; see bottom image of FIGs. 1g). It would have been obvious for one of ordinary skill in the art at the time the invention was made to configure the fine channel **10** in the apparatus of Young et al. as instantly claimed, on the basis of suitability for the intended use, because the configuration of a non-straight portion containing a partition wall in addition to a straight portion allows for the formation of a fine channel device having a great fine channel length on a given area of substrate.

Regarding claim 18, Young et al. is silent as to the provision of a current supply means and/or a voltage supply means for the metallic film. Christel et al. teaches the provision of a current supply means and/or a voltage supply means (i.e., via an AC or DC voltage; see column 8, line 14 to column 9, line 28). It would have been obvious for one of ordinary skill in the art at

the time the invention was made to provide a current supply means and/or a voltage supply means for the metallic film in the device of Young et al., on the basis of suitability for the intended use thereof, because the current supply and/or voltage supply means further aids in the separation of molecules in the device via a change in polarity, as taught by Christel et al.

Regarding claims 21 and 22, Young et al. is silent as to the fine channel device further comprising a means for supplying energy to fluid flowing through the fine channel **10**. Christel teaches the provision of means, such as a heating device (column 9, lines 29-37), for supplying energy to fluid flowing through the fine channel. It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide a means for supplying energy to the apparatus of Young et al., because the means (i.e., a heating device) would provide additional functional capabilities to the apparatus, as taught by Christel (see column 9, lines 31-35).

Regarding claim 23, the fine channel **10** of Young et al. is formed two-dimensionally or three-dimensionally (e.g., by etching; see sections [0051]). Furthermore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to configure a plurality of fine channels **10** in the device of Young et al., on the basis of suitability for the intended use, because a plurality of fine channels allows for an increase in the duration of diffusive mixing, as evidenced by Christel et al. (see FIG. 4; column 4, lines 23-28). In addition, it has been held that duplication of part was held to have been obvious. *St. Regis Paper Co. v. Beemis Co. Inc.* 193 USPQ 8, 11 (1977); *In re Harza* 124 USPQ 378 (CCPA 1960).

4. Claims 1, 3, 4, 8, 12-14, 17-19 and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Christel et al. (US 6,368,871) in view of Giddings (US 4,894,146).

Regarding claims 1, 3 and 24, Christel et al. discloses a fine channel device (see FIGs. 3-

5, 1f, 1g; column 2, line 56 to column 3, line 10) comprising:

a fine channel (i.e., contact or interdiffusion region **110**) provided with at least two inlet ports; inlet channels (i.e., deep channels **101** and **102**) communicating with the inlet ports; a confluent portion (i.e., the point of intersection of channels **101** and **102**) communicating with the inlet channels; a branch portion (i.e., at the point where channel **110** splits into channels **103** and **104**) communicating with the fine channel **110**, from which at least two outlet channels **103** and **104** are branched; and outlet ports communicating with the outlet channels **103** and **104**;

wherein the fine channel **110** is provided with a plurality of partition walls (i.e., micro-columns **111**; see also column 7, lines 40-54) arranged along a boundary formed by at least two kinds of fluid fed from the inlet ports; wherein the plurality of partition walls **111** are arranged with intervals in a flowing direction of fluid (see FIGs. 5, 1f and 1g); wherein, as best shown in FIG. 1f, the height of the partition walls **111** is substantially the same as the depth of the fine channel **110** (see also column 7, lines 40-54); and wherein each of the partition walls **111** has an upper edge that is elongated and extends along a line parallel to a fluid flow path within the fine channel (see, e.g., FIG. 1f, 1g, 5).

Christel et al., however, is silent as to the addition of a partition wall being connected to the confluent portion and another partition wall being connected to the branch portion, such that the intervals between the partition walls **111** are present along the entire length of the fine channel **110**, except in the vicinity of the confluent portion and the vicinity of the branch portion of the fine channel.

Giddings (FIG. 3) teaches a fine channel device wherein a partition wall (i.e., inlet splitter **15a**) is connected to the confluent portion and another partition wall (i.e., outlet splitter **15d**) is

connected to the branch portion. It would have been obvious for one of ordinary skill in the art at the time the invention was made to further provide a partition wall being connected to the confluent portion and a partition wall being connected to the branch portion, such that the intervals between the partition walls **111** are present along the entire length of the fine channel **110**, except in the vicinity of the confluent portion and the vicinity of the branch portion of the fine channel **110** of Christel et al., on the basis of suitability for the intended use, because the provision of partition walls, connected to the confluent and branch portions, improves the splitting of the plural fluid streams into their physically distinct laminae at the entrance and exit of the fine channel, as taught by Giddings.

The newly added limitation of the intervals being, "a distance that is greater than an elongated length of each partition wall," is not considered to confer patentability to the claim since the precise distance would have been considered a result effective variable by one having ordinary skill in the art. For instance, Christel et al. (column 6, lines 58-68) discloses that,

> "... depending on the stability of the fluid streams in contact with each other, it may be possible to have a very long diffusion region, with no equilibration regions. In this case, the fluid flow could be "flat" on the surface of the element. On the other hand, if the stability of the fluid streams is very low, it is possible to provide additional very small "pillars" along the diffusion interface (like miniature jail bars) to further reduce the tendency of the fluids to mix or the streams to become unstable."

Accordingly, one having ordinary skill in the art would have routinely optimized the distance between the partition walls for a given partition wall length in the system of Christel et al., in order to maximize the rate of diffusive transfer of a constituent from one fluid stream to the other fluid stream through the interfacial boundary, while maintaining a stable interfacial boundary

between the two or more fluid streams and reducing the tendency of the fluids to mix, *In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980), and since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claim 4, partition walls **111** are provided at positions apart from the confluent portion and the branch portion (see FIG. 5).

Regarding claim 8, a portion of the fine channel **110** has a shape other than a straight shape, and the partition wall **111** in said portion extends from the vicinity of a portion originating a non-straight portion of fine channel to the vicinity of a portion ending the non-straight portion of fine channel (i.e., a plurality of U-shaped fine channel portions, each containing a U-shaped micro-column or island; see bottom image of FIGs. 1g).

Regarding claim 12, the device of Christel et al. structurally meets the claim because the direction of fluid flow is considered intended use.

Regarding claims 13 and 14, as best understood, the inner wall has amicability to hydrophilic/hydrophobic properties to a kind of fluid fed into the fine channel, wherein the hydrophilic properties of a material are different from hydrophilic properties of the fluid fed into the fine channel (see column 7, lines 1-9 and 18-21; column 6, lines 14-20).

Regarding claims 17, 18 and 19, Christel et al. discloses the provision of a current supply means and/or a voltage supply means (i.e., an AC or DC voltage; column 8, line 14 to column 9, line 15) for an underlying conductor disposed in the entire or a part of the inner surface of the fine channel and/or the wall surface of the partition walls. Christel et al., however, is silent as to the underlying conductor comprising a metallic film. In any event, it would have been obvious

for one of ordinary skill in the art at the time the invention was made to select a metallic film for the underlying conductor in the device of Christel et al., on the basis of suitability for the intended use thereof, because the Examiner takes Official Notice that the use of metallic films as electrically conductive materials is well known in the art.

Regarding claims 21 and 22, Christel et al. further discloses means for supplying energy to fluid flowing the fine channel (i.e., a heating device; see column 9, lines 19-37).

Regarding claim 23, a plurality of fine channels **110** (FIG. 5) are formed two-dimensionally or three dimensionally (e.g., by etching on silicon, etc.; see column 5, line 44 to column 6, line 26).

Response to Arguments

5. Applicant's arguments filed May 4, 2007 have been fully considered but they are not persuasive.

A. Comments regarding the rejection of claims 1-5, 10-17, 19, 20 and 24 under 35 U.S.C. 103(a) as being unpatentable over Young et al. (US 2003/0226806) in view of Giddings (US 4,894,146); and the rejection of claims 8, 18 and 21-23 under 35 U.S.C. 103(a) as being unpatentable over Young et al. in view of Giddings, as applied to claims 1 and 17 above, and further in view of Christel et al. (US 6,368,871).

Applicant (beginning with the line 3 on page 10) argues,

> "... the shapes of the channel structures depicted in the Young et al. reference do not clearly disclose a configuration in which each channel structure of a plurality of channel structures has an upper edge that is elongated and extends along a line parallel to a fluid flow path, with the possible exception of the generic dashed depictions in Figures 4 and 10. Most of the embodiments depicted in detail, such as in Figure 5, depict shapes

and groupings that do not correspond to such a limitation."

The Examiner respectfully disagrees. To be "elongated" is to have a length that is greater than its width. Young et al. clearly discloses that the channel structures **200** may be elongated, i.e., having lengths that are greater than their widths, where the length of the channel structures **200** extends along a line $\mathbf{C_L}$ parallel to the fluid flow path (see, e.g., FIGs. 6A and 11). Young et al. further discloses that the channel structures **200** may be configured as various elongated shapes, such as the shape depicted in 5A, and the rectangles and ellipses suggested in section [0042].

Applicant (beginning with line 8 on page 10) then argues,

> "... all of the embodiments of the Young et al. reference show a very tight spacing between the channel structures. The Young et al. reference does not disclose an embodiment that teaches a structure as recited in Claims 1 and 24 where each partition wall of the plurality of partition walls has an upper edge that is elongated and extends along a line parallel to a fluid flow path within the fine channel, and *the plurality of partition walls are spaced apart by a distance that is greater than an elongated length of each partition wall.* All of the embodiments of the Young et al. reference depict very small spacings in between channels structures, which are in many cases much longer than the spacings therebetween (see, e.g., Figures 5A, 5D, etc.). While the Young et al. reference may make broad statements regarding spacing and shape, the Young et al. reference does not provide any teaching or suggestion of the advantages combination of features recited in Claims 1 and 24. Thus, not only does the Young et al. reference fail to disclose such a space/length relationship, but the Young et al. reference does not provide a suggestion or motivation to arrive at such a relationship, absent hindsight."

The Examiner respectfully disagrees.

Because Young et al. does not indicate that the drawings are to scale, Applicant's argument with respect to the "very small spacings" between the partition walls, as depicted in the

figures, is of little value. Furthermore, disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments. See *In re Susi*, 440 F.2d 442, 169 USPQ 423 (CCPA 1971). In the instant case, Young et al. (see section [0041]) further discloses that,

> "As is well known to those skilled in the art, the diffusive transfer of a constituent through an interfacial boundary is directly proportional to the area of the interfacial boundary, and inversely proportional to the thickness of the interfacial boundary. It is believed that the fluid extraction device of the present invention maximizes diffusive transfer by providing a large, no-slip interfacial boundary area, and a small interfacial boundary thickness (also referred to as diffusion distance). The present invention allows for this maximized diffusive transfer without destabilizing the interfacial boundary. A stable interfacial boundary is desired in order to maintain pressure differentials across the boundary (which arise from differences in flow velocity, viscosity, or channel dimensions between the two fluid flowing in flow paths **210** and **215**)."

Young et al. (see sections [0041]-[0042]) also discloses that the diffusive transfer of a constituent through the interfacial boundary can be controlled by simply varying the dimensions, shape and/or grouping/spacing of the partition walls **200** within the fine channel **10**.

Accordingly, one having ordinary skill in the art would have routinely optimized the distance between the partition walls **200** for a given partition wall length in the system of Young et al., in order to maximize the rate of diffusive transfer of a constituent from one fluid stream to the other fluid stream through the interfacial boundary, while maintaining a stable interfacial boundary between the two or more fluid streams, *In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980), and since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill

in the art. *In re Aller*, 105 USPQ 233. Furthermore, if a person of ordinary skill in the art can implement a predictable variation, and would see the benefit of doing so, §103 likely bars its patentability. *KSR International Co. v. Teleflex, Inc.*, 82 USPQ 2d 1385 (US 2007).

In response to Applicant's argument that the Examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Applicant (beginning with the last line on page 10) further argues,

> "... the Giddings reference does not to cure the above noted deficiency in the teaching of the Young et al. reference. The Giddings et al. reference describes a thin channel split flow process for particle fractionation that effects separation of the particles. The Official Action cites physical splitter (15a) as the partition wall located in the vicinity of a confluent portion, and physical splitter (15d) as the partition wall located in the vicinity of the branch portion. However, the Giddings reference does not disclose or even suggest a plurality of such walls spaced apart at intervals in a flowing direction of fluid, or any particular spacing/length relationship. Thus, the Giddings reference does not disclose or suggest a structure where each partition wall of the plurality of partition walls has an upper edge that is elongated and extends along a line parallel to a fluid flow path within the fine channel, and *the plurality of partition walls are spaced apart by a distance that is greater than an elongated length of each partition wall.*"

Applicant's argument is not found persuasive. Please note that the secondary reference to Giddings was merely relied upon for its teaching of a partition wall (i.e., inlet splitter **15a**)

connected to the confluent portion and another partition wall (i.e., outlet splitter **15d**) connected to the branch portion (FIG. 3). The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

B. Comments regarding the rejection of claims 1, 3, 4, 8, 12-14, 17-19 and 21-24 under 35 U.S.C. 103(a) as being unpatentable over Christel et al. (US 6,368,871) in view of Giddings (US 4,894,146).

Applicant (beginning with the last paragraph on page 11) argues,

> "Regarding the rejection of Claims 1 and 24 based on the combined teachings of the Christel et al. reference and the Giddings reference, the Official Action cites microcolumns 111, for example as depicted in Figure 5, for the teaching of the partition walls of the present invention. Firstly, the Applicants note that the microcolumns 111 depicted in Figure 5 of the Christel et al. reference do not disclose a configuration in which each channel structure of a plurality of channel structures has an upper edge that is elongated and extends along a line parallel to a fluid flow path."

The Examiner respectfully disagrees. To be "elongated" is to have a length that is greater than its width. As clearly shown in Figure 1f, for example, the partition walls are configured with a length greater than their width, and the partition walls have their elongated length extending along a line parallel to a fluid flow path. In addition, Christel et al. discloses that the partition walls may be "of any shape or size so as to provide a high surface area array", such as a rectangular, and hence elongated, shape (see, e.g., column 7, lines 40-54).

Applicant (beginning with the last line on page 11) then argues,

> "... The Christel et al. reference includes a generic discussion of the configurations of the microcolumns in column 7, lines 40-54, but does not appear to specifically discuss spacing of the microcolumns, and does not discuss a relationship between an elongated length of the microcolumns and a spacing between microcolumns. Most of the embodiments depicted in detail, such as Figures 1a and 5, depict shapes and groupings that do not correspond to the limitations recited in Claims 1 and 24. Furthermore, the Christel et al. reference shows spacings between the microcolumns in most if not all embodiments that are smaller than the length of the microcolumns in the flow direction. The Christel et al. reference does not disclose an embodiment that teaches a structure as recited in Claims 1 and 24 where *each partition wall of the plurality of partition walls has an upper edge that is elongated and extends along a line parallel to a fluid flow path within the fine channel,* and *the plurality of partition walls are spaced apart by a distance that is greater than an elongated length of each partition wall.* While the Christel et al. reference may make broad statements regarding shape of microcolumns, the Christel et al. reference does not provide any teaching or suggestion of the advantages combination of features recited in Claims 1 and 24. Thus, not only does the Christel et al. reference fail to disclose such a shape and space/length relationship, but the Christel et al. reference does not provide a suggestion or motivation to arrive at such a relationship, absent hindsight.
>
> Additionally, as noted above, the Giddings reference does not to cure the above noted deficiencies, and therefore the Giddings reference does not to cure the deficiencies in the teaching of the Christel et al. reference."

The Examiner respectfully disagrees.

Disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments. See *In re Susi*, 440 F.2d 442, 169 USPQ 423 (CCPA 1971). In the instant case, Christel et al. (column 6, lines 58-68) discloses that,

> "... depending on the stability of the fluid streams in contact with each other, it may be possible to have a very long diffusion region, with no equilibration regions. In this case, the fluid flow could be "flat" on the surface of the element. On the other hand, if the stability of the fluid streams is very low, it is possible to provide additional very small "pillars" along the diffusion interface (like miniature jail bars) to further reduce the tendency of the fluids to mix or the streams to become unstable."

Accordingly, one having ordinary skill in the art would have routinely optimized the distance between the partition walls for a given partition wall length in the system of Christel et al., in order to maximize the rate of diffusive transfer of a constituent from one fluid stream to the other fluid stream through the interfacial boundary, while maintaining a stable interfacial boundary between the two or more fluid streams and reducing the tendency of the fluids to mix, *In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980), and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Furthermore, if a person of ordinary skill in the art can implement a predictable variation, and would see the benefit of doing so, §103 likely bars its patentability. *KSR International Co. v. Teleflex, Inc.*, 82 USPQ 2d 1385 (US 2007).

In response to Applicant's argument that the Examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Please note that the secondary reference to Giddings was merely relied upon for its teaching of a partition wall (i.e., inlet splitter **15a**) connected to the confluent portion and another partition wall (i.e., outlet splitter **15d**) connected to the branch portion (FIG. 3). The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jennifer A. Leung/
Examiner, Art Unit 1797
January 18, 2008